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BY THE COMPTROLLER GENERAL

COMPLETED 38

Report To The Congress

OF THE UNITED STATES

Eliminating Contractor Inspections Of Federal Water Projects Could Save Millions

Construction costs for Corps of Engineers dams and other water projects could be reduced by about $6 million to $7 million annually if the Secretary of Defense exempted construction contractors from inspecting their own work. Corps officials already inspect this work as an essential quality control measure. The duplication thwarts an economical approach and causes unnecessary paperwork.

CED-81-146

SEPTEMBER 29, 1981

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

This report discusses three approaches to inspecting the construction of dams and other Federal water resources projects--contractor self-inspection with agency monitoring, used by the Corps of Engineers; agency inspection, used by the Bureau of Reclamation; and third-party inspection, occasionally used by both agencies.

We made this review to determine the most economical way of accomplishing inspection objectives for water projects. Recent public concern about the cost of Government emphasizes the need to reduce expenses wherever practical. We had recommended an evaluation of the Corps' contractor inspection approach in a 1972 report to the Secretary of Defense. This report follows up on that effort.

Copies of this report are being sent to appropriate House and Senate committees; the Director, Office of Management and Budget; the Secretaries of the Army, Defense, and the Interior; and other interested parties.

Milton J. Socolar

Acting Comptroller General
of the United States

III

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

ELIMINATING CONTRACTOR INSPECTIONS OF FEDERAL WATER PROJECTS COULD SAVE MILLIONS

D I G E S T

Since 1966 the U.S. Army Corps of Engineers has required construction contractors to inspect their own work on Corps dams, powerhouses, and other water projects. In practice, Corps civil works officials, to assure project quality, inspect the same activities they require contractors to inspect, thus duplicating and often exceeding the contractors' efforts. (See p. 8.) This duplication affects staff, laboratory facilities, and paperwork and increases the Government's construction costs by about $6-$7 million annually. (See p. 21.)

The Bureau of Reclamation and other water project construction agencies do not require contractor inspections--they rely on their own staff to inspect construction. GAO reviewed these two approaches and the use of third-party inspection organizations to determine the most economical way of accomplishing inspection objectives.

The Corps established its contractor inspection requirement to comply with Department of Defense regulations that had been developed to produce better construction quality, less Government inspection, and improved agency/contractor relations. For about 5 years after the regulations were developed, the Corps' civil works directorate opposed their application to water project construction due to concerns about project quality and possible duplication of effort. In 1966, after the Chief of Engineers ordered contractor inspections on both Corps civil and military works, the civil works directorate hoped to satisfy its concerns by closely monitoring contractor compliance with the inspection requirements. (See pp. 6 and 7.)

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Tear Sheet

In 1973 the civil works directorate's concerns about contractor inspections were realized. After the Corps tried to rely on contractor inspections, it discovered a major quality defect late in construction that threatened a project's safety. (See p. 15.)

Project quality is also a strong concern of the Bureau of Reclamation and the California Department of Water Resources, two large water resource development agencies that object to the contractor inspection approach. GAO found that the Bureau's agency inspection approach achieves the same objective as the Corps' dual inspections, but without duplicating inspection efforts. Although the Bureau does not require contractors to inspect their own work, it includes provisions in contracts that hold contractors responsible for construction quality. California patterned its inspection approach after the Bureau's. (See pp. 15 and 21.)

GAO favors agency inspections over contractor inspections to help assure project quality. Poor quality construction can cause projects to fail, resulting in catastrophic losses of life and property. Such failures can occur if inspectors do not ensure contractor compliance with the quality controls established in agency designs and specifications. Also, inspectors who are independent of construction contractors appear less production-oriented and more concerned about project quality than contractor personnel. (See pp. 11 and 12.)

Third-party organizations can provide inspections that are independent of the construction contractor, but experience indicates that these inspections are too costly and administratively burdensome to be a viable alternative to agency inspection, except in limited circumstances. (See p. 22.)

CONCLUSION

Past experience and several studies have demonstrated the ineffectiveness of contractor inspection requirements. Rather than improving construction quality while reducing Government inspections, the requirement has resulted in a duplication of inspection efforts and facilities, unnecessary paperwork, and increased administrative costs.

The Defense Department could avoid a costly duplication of agency inspection efforts and facilities by exempting water project construction activities from its contractor inspection regulations. Since the Corps already thoroughly inspects these activities without relying on contractor inspections, such actions need not increase agency staff requirements.

RECOMMENDATION

To help reduce costs and provide the quality control essential for activities involved in constructing dams, powerhouses, and other water projects, GAO recommends that the Secretary of Defense exempt Corps water project construction activities from the requirement for contractor inspections.

AGENCY COMMENTS AND GAO's EVALUATION

The Departments of the Army and the Interior concurred with GAO's recommendation. Army observed and GAO concurs that elimination of the requirement for contractor inspections does not absolve contractors from the responsibility and liability for mistakes which they may make in meeting the quality standards. Army's comments were coordinated with the Department of Defense and represent the views of both Departments. (See p. 25.)

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ABBREVIATIONS

CQC	contractor quality control
DOD	Department of Defense
GAO	General Accounting Office

CHAPTER 1

INTRODUCTION

Dams and other water projects, if not constructed adequately, have the potential to cause catastrophic loss of life and property. This potential imparts a tremendous legal and moral responsibility on construction agencies to prevent poorly constructed water projects. Thorough and objective inspection during construction helps meet this responsibility by assuring that construction work complies with project designs and specifications.

This report primarily concerns the two major Federal water resource development agencies--the Corps of Engineers (Civil Works), Department of the Army, and the Bureau of Reclamation, Department of the Interior. These agencies approach construction inspection differently. The Corps requires its construction contractors to inspect construction work under a system which includes Corps monitoring. The Bureau requires its own staff to inspect the contractor's work.

BUREAU AND CORPS CONSTRUCTION INSPECTION PROGRAMS

The Reclamation Act of 1902 (43 USC 371 et seq.) authorizes the Secretary of the Interior to plan, build, operate, and maintain water projects designed to reclaim arid and semiarid lands in the 17 Western States. In achieving this end, the Bureau of Reclamation has designed and constructed more than 300 major dams. The Corps constructs, operates, and maintains navigation, flood control, and multiple-purpose projects throughout the Nation. Since the inception of its civil works responsibility in 1824 (4 Stat. 32), the Corps has developed more than 500 major dams.

Construction remains a major part of both agencies' responsibilities. Fiscal year 1982 budget requests for construction were $617.6 million for the Bureau, an increase of $39.3 million over 1981 expenditures, and $1,801.7 million for the Corps, an increase of $143.6 million over 1981 expeditures. These requests are for construction programs to continue work on 73 Bureau and 197 Corps projects.

Private contractors build Corps and Bureau projects under contract with the Government. These contracts incorporate detailed designs and specifications that the agencies prepare to guide each step of the construction process. Inspection ensures that the contractors comply with the required designs and specifications.

A large number and variety of inspection personnel may be required for any particular construction project. The chart on page 3 depicts the Corps organization responsible for day-to-day Government supervision and administration of one large construction project selected for this study. About 62 percent of the positions

outside the area engineer's office and administrative branch represent full-time inspectors; the remaining positions use inspection data. The Bureau also has a high percentage of project personnel who inspect construction.

Agency estimates showed that in fiscal year 1980 the Corps and Bureau together devoted 2,214 staff years to construction inspections. The cost of such services for the two agencies combined averaged $38.1 million annually over the 5-year period ending September 30, 1980. These amounts by agency are as follows:

	Staff years (1980)	Cost in millions (5-year average)
Corps	1,523	$25.6
Bureau	691	12.5
Total	2,214	$38.1

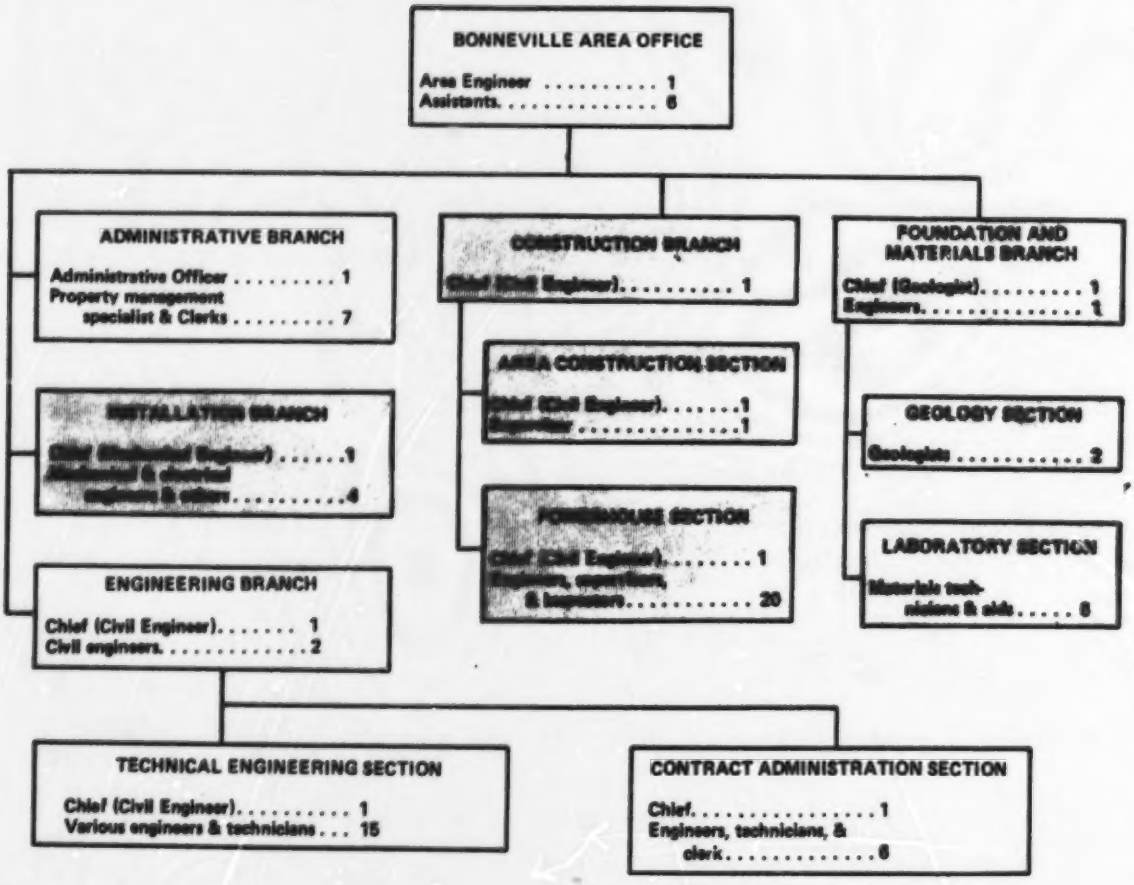
These averages do not include administrative and overhead expenses or annual Corps costs of $1,774,860 and Bureau costs of $836,200 for laboratories and inspection equipment. These averages also exclude other sources of inspection costs. One source is third-party inspection organizations, sometimes used to complement inhouse staff. In fiscal year 1980 these costs totaled $3.7 million for the Corps and $67,000 for the Bureau. Another source is construction contractor personnel, which the Corps uses extensively but the Bureau does not. The actual cost of these services is unknown as they are included in construction bid prices. We estimate that in recent years the Corps has paid about $6-$7 million annually for these services.

OBJECTIVE, SCOPE, AND METHODOLOGY

Our primary objective was to determine which inspection approach, the Corps' or Bureau's, assures construction quality at the least cost for water projects. Our review was essentially a followup on a 1972 report we issued to the Secretary of Defense questioning a Corps requirement that construction contractors for civil works projects inspect their own work. 1/

1/"Need to Evaluate the Continued Application of Contractor Quality Control to Civil Works Construction"(B-118634, June 27, 1972).

SIMPLIFIED CHART OF THE CORPS ORGANIZATION RESPONSIBLE FOR DAY-TO-DAY SUPERVISION AND ADMINISTRATION OF CONSTRUCTION FOR THE BONNEVILLE SECOND POWERHOUSE


BONNEVILLE AREA OFFICE
Area Engineer 1
Assistants. 6
ADMINISTRATIVE BRANCH
Administrative Officer 1
Property management specialist & Clerks 7
INSTALLATION BRANCH
. 1
. 4
ENGINEERING BRANCH
Chief (Civil Engineer). 1
Civil engineers. 2
CONSTRUCTION BRANCH
. 1
AREA CONSTRUCTION SECTION
. 1
. 1
POWERHOUSE SECTION
. 1
. 20
FOUNDATION AND MATERIALS BRANCH
Chief (Geologist). 1
Engineers. 1
GEOLOGY SECTION
Geologists 2
LABORATORY SECTION
. 6
TECHNICAL ENGINEERING SECTION
Chief (Civil Engineer). 1
Various engineers & technicians . . . 15
CONTRACT ADMINISTRATION SECTION
Chief. 1
Engineers, technicians, & clerk. 6

Numbers in blocks signify staff positions.
All the shaded area is inspection staff.
The engineering Branch uses inspection data.

To determine which inspection approach was best, we studied the advantages and disadvantages of both agencies' approaches. Recognizing that the agencies sometimes face staff shortages, we also considered the use of third-party inspection organizations. We considered how the various approaches affect construction quality, although we did not evaluate construction quality in total. Also, we did not evaluate agency inspection techniques.

Our study of the Corps approach was limited to its civil functions. Within both agencies, we primarily concentrated on the construction components that combine to form a water retention structure. Other structures associated with water projects, such as offices, recreation facilities, and railroad and road relocations, are less subject to catastrophic losses should failure occur.

We determined what tests and observations inspectors are required to perform, their purpose, and use. To check practices, we selected six active construction projects--four from the Corps (because it is the larger agency and uses contractor inspections) and two from the Bureau. Our selection criteria included geographic dispersion, large construction costs, construction variety (that is, earthfill and concrete dams, canals, and waterways), and many different contractors. Identifying data for the six selected projects follows.

Agency	Project	Location	Cost	Purpose
Corps	Bonneville Second Powerhouse	Washington	$650 million	Power
Corps	Richard B. Russell Dam	Georgia	$462 million	Power
Corps	Red River Waterway	Louisiana	$1.7 billion	Navigation
Corps	Warm Springs Dam	California	$274 million	Flood control
Bureau	Central Arizona	Arizona	$2.1 billion	Irrigation
Bureau	Dolores Participating	Colorado	$388 million	Irrigation

For each project, we concentrated on the largest active contract (in terms of dollars) dealing with primary project features. These contracts ranged from about $25 million to $245 million each. To determine inspection procedures and practices

on these contracts, we reviewed inspection plans, standards, laboratory test reports, reports on visual examinations of workmanship, and contract and correspondence files.

For the four Corps projects, we compared Corps and contractor inspection standards and practices for recent, critical construction activities. We also determined inspection standards and practices for the two Bureau projects and compared them with the Corps' for selected activities. We also reviewed inspection-related records, files, policies, and procedures at field and headquarters offices.

Due to the technical nature of the inspection function, the judgments involved, and the absence of complete records on many inspection matters, we also relied heavily on interviews. Altogether, we conducted 74 interviews with 95 individuals. Of these, 53 were conducted at the six projects visited, including 16 with contractor officials and 37 with Corps and Bureau representatives including inspectors, supervisors, and management officials reponsible for the inspection function. Words like "most" or "some," used in this report to indicate the extent of agreement among officials interviewed, relate to these numbers of interviews.

These interviews were designed to uniformly probe certain preselected subjects including advantages and disadvantages of the various inspection approaches, criteria governing inspections, agency and contractor use of inspections, experiences with preventing and correcting construction mistakes, the cost of contractor inspections, and preferred inspection staffing approaches.

In addition, we conducted 16 interviews with officials in field offices above the project level and at agency headquarters. These interviews were primarily designed to understand inspection policy and the basis for it and to review agency evaluations of inspection practices.

Another five interviews involved other organizations concerned with water project construction. These were interviews with the Associated General Contractors of America; Tennessee Valley Authority; Soil Conservation Service, Department of Agriculture; and Department of Water Resources, State of California. Two of the five interviews were with representatives of the California Department of Water Resources. We also reviewed available records of that agency's inspection policies, procedures, and experiences. California has a significant water resources development program. It constructed the $2.1-billion California Water Project and is presently planning the $7-billion Peripheral Canal.

Appendix I lists the primary organizations involved in our review.

CHAPTER 2

CONTRACTOR INSPECTIONS ARE COSTLY AND INEFFECTIVE

To comply with a Department of Defense (DOD) policy, the Corps of Engineers requires construction contractors to inspect their own work. The policy applies to both Corps civil and defense work but for civil work, involving the construction of dams and other water resource projects, the Corps performs its own inspections in addition to requiring contractor inspections. For this work, the requirement increases contract costs to the Government by about $6-$7 million annually without achieving better construction quality or other expected benefits.

The Corps relies on its own inspections to assure that the quality designed into its projects is achieved. The Bureau of Reclamation and other water project construction agencies share the Corps' concern about project quality but resolve this concern by inspecting construction independently without requiring contractor inspections. Third-party organizations can also provide independent inspections, but their services are usually more costly than agency inspections.

CONTRACTOR INSPECTIONS EVOLVED FROM DOD REGULATIONS

Until 1966 the Corps relied principally on its own inspections of construction quality on such civil works projects as locks, dams, levees, and powerhouses where the Federal investment is extensive and where project failure could mean catastrophic loss of life and property. Corps records indicated that this traditional practice resulted in a high degree of construction quality. The Corps requirement for contractor inspections evolved from a 1954 DOD directive requiring contractor inspections on certain supply and development contracts. DOD incorporated this directive into its Defense Acquisition Regulations (formerly the Armed Services Procurement Regulations). In 1961 DOD broadened the requirement to include all fixed-price construction contracts over $10,000. The directive stated:

> "The Contractor shall (i) maintain an adequate inspection system and perform such inspection as will assure that the work performed under the contract conforms to contract requirements, and (ii) maintain and make available to the Government adequate records of such inspections."

DOD expected this requirement to produce better quality construction; eventually reduce inspections by Government agencies; and, through better communication, improve the working atmosphere between the agency and the contractor.

During the 5-year period between issuance of this directive

in 1961 and the Corps' engineering regulation (ER-1180-1-6) implementing it in December 1966, considerable controversy took place within the Corps about whether contractor inspections were appropriate for Corps construction and how to implement such inspections. The Corps military construction directorate supported contractor inspections for military purposes while the civil works directorate initially opposed it for civil works.

The military construction directorate contended that contractor inspections could reduce supervision and administrative costs without reducing the quality of the finished product. It also claimed they could reduce the number of claims for correcting deficient work by making contractors more responsible for the quality of their work.

The civil works directorate contended that each step of civil works construction, from foundation preparation through laboratory testing to construction of the component parts, must be under the direct surveillance of Government inspectors. It recognized that the contractor had to exercise some quality control of materials and operations but stated that to require the contractor to maintain a separate inspection staff on work that required daily Government inspection would be a wasteful duplication.

Despite the civil works directorate's opposition, the Chief of Engineers directed that a regulation covering both military and civil works construction be prepared to implement the DOD requirement. The stated goal of the engineering regulation (ER 1180-1-6, Dec. 1, 1966) was to improve the quality of construction by requiring construction contractors to assume greater responsibility for inspection and testing of their work. The regulation stated that the long-range result might be fewer Government inspection positions, which could be filled by better qualified people at higher grades.

To implement the Chief's directive, the Corps provides that construction contractors (1) file an inspection plan to explain how the inspection will be accomplished, (2) inspect essentially all the work to assure that it complies with contract specifications, and (3) submit inspection reports to describe inspection activities and significant findings. The Corps, in turn, is supposed to monitor contractor compliance with these provisions, enforce them when necessary by imposing sanctions available in the contract, and inspect the finished product. The Corps describes the contractors' responsibility as quality control and its own as quality assurance.

The Corps also has the following requirements:

--A Corps engineering manual on dam construction (EM 1110-2-1911) providing that the Corps inspection force must be adequate to continuously inspect contractor operations.

--A Corps regulation on construction staffing (ER 415-2-100) requiring that Corps personnel provide full-time inspection of all contractor operations on such construction as locks, dams, levees, and powerhouses.

THE CORPS DOES NOT RELY ON CONTRACTOR INSPECTIONS

Apparently, Corps inspectors interpret the above requirements as encouraging full agency reliance on their own inspections instead of the contractor's. This reliance was demonstrated by the manner in which Corps personnel treated contractor inspection efforts at the four projects we visited. They accepted inadequate inspection plans and reports from the contractor, inspected the construction process themselves, and did not attempt to enforce the inspection provisions of construction contracts.

The Corps accepts inadequate inspection plans

At each project visited, the Corps approved contractor inspection plans that merely summarized or acknowledged the contract requirements without supplying required information. For example:

--The Bonneville Second Powerhouse contractor's plan for inspecting waste material disposal did not identify when and how inspection would take place, as required. The plan proposed only to (1) review applicable contract requirements, (2) see that disposal was being done correctly, and (3) see that any deviations from specifications were corrected.

--A Russell Dam contractor's plan for inspecting the concrete batching (mixing) plant did not identify the means to be used to measure, control, and report on all constituent elements of the concrete, as required by the contract. Instead, the contractor's inspection plan stated only that "inspections will be made in accordance with the contract specifications."

Contractor personnel at three projects said that they considered inspection plans to be only a formality required by the Corps--they did not look at the plans again once the Corps had accepted them.

The Corps does sufficient inspection itself

Nearly all project-level construction officials interviewed, both Corps and contractor, who expressed a view on contractor inspections, acknowledged that the Corps inspects construction and

relies on its own inspection efforts to assure that work and materials comply with requirements. They said that the Corps acts as though the contractor were doing no inspection at all. This was confirmed at each of the four projects by our comparisons between Corps and contractor inspections for control of the batch plant, concrete placement, earthfill placement, concrete testing, aggregate (sand and gravel) testing, and soil moisture testing. The comparisons showed that the Corps met or exceeded the inspection standards established by the Corps for the contractor. For example:

--The contractor assigned one or two full-time inspectors per shift (depending on the size of the job) to inspect the control of the concrete batch plant, as did the Corps. This sometimes led to a condition where a Corps and a contractor inspector would watch one another make tests or would both watch one person do the batch plant work.

--The contractor used a foreman who was responsible for the placement crew to inspect earthfill placement while the Corps provided a full-time inspector to examine the same work.

Numerous Corps inspectors claimed that the Corps was doing so much inspection that if all the contractor's inspection staff quit, the Corps would not have to add anyone to adequately inspect construction. Corps inspection staffing greatly exceeded contractor inspection staffing for each of the four projects, as shown in the table on page 19.

Contractor inspection reports are not useful to the Corps

The Corps and the contractor both prepared inspection reports covering the same activities at the four projects we visited. The Corps reports were generally specific and timely. The contractors' reports were frequently late, incomplete, and rarely used by the Corps. For example:

--The Warm Springs Dam contractor submitted daily reports an average of 6 days late over a 2-month period, with some reports delivered as much as 2 weeks after the work had been done.

--The Corps' report examining workmanship for 1 day's activity at Red River Waterway was 17 pages long, while the contractor's report for the same day was 2 pages long and did not list inspection activities, observations, test data, or corrective actions taken, as required.

The Corps' inspection reports often disclosed construction problems discussed with the contractor that were not covered in the contractor's reports, and five Corps inspectors told us that they did not review the contractor's reports because they believed the reports to be of no value. Of 10 contractor officials interviewed, 7 confirmed that neither the Corps nor the contractor was using the contractor reports.

A contractor's inspection chief at one project echoed a Corps official at another project when he said that the primary function of contractor inspection reports was to fill file drawers.

The Corps seldom enforces contract inspection requirements

We did not find any instances for the four Corps projects visited where Corps officials tried to enforce the inspection provisions of construction contracts. When a contractor's inspections are inadequate, Corps officials can resort to such general contract enforcement tools as stop-work orders, removing incompetent personnel, withholding payment for work, and contract termination. Corps manuals and training seminars encourage using such tools to deal with inadequate contractor inspection plans, actions, and reports.

Contractor inspection was not enforced even when the Corps discovered construction problems that the contractors were supposed to discover. For example, Corps personnel frequently discovered that the aggregate entering the concrete batch plant at one project did not meet specifications and ordered the contractor to shut down the batch plant 17 times over a 6-month period to force corrective action. But the Corps directives ordering the contractor to bring the aggregate into specification made no mention of the contractor inspection system's failure to identify the deficient aggregate.

A 1980 Corps resident engineers seminar reported a general failure of Corps officials to apply contract enforcement provisions to contractor inspections.

PROJECT QUALITY CONCERNS EXPLAIN WHY CORPS OFFICIALS DO NOT RELY ON CONTRACTOR INSPECTIONS

The strong agency concern for project quality compels construction agency officials to inspect construction themselves regardless of contractor inspections. Their concern for quality stems largely from the potentially disastrous consequences of project failure. To avoid the risk of failure, the agencies establish extensive quality controls in their designs and specifications which, in turn, entails thorough inspections to ensure that the controls are followed. Agency officials object to using contractors for these inspections, preferring independent

inspections instead. Many contractor officials also object to contractor inspections.

Project failure can have disastrous consequences

The rapid, uncontrolled flow of water from a dam reservoir releases a destructive force dramatically illustrated by many dam failures within the United States. An early reminder is the 2,200 lives lost when an earthfill dam at Johnstown, Pennsylvania, failed in 1889. Since 1930 more than 100 large dams have failed in the United States, causing hundred of deaths and extensive property damage. The 1972 failure of the Buffalo Creek, West Virginia, Mine Refuse Embankment and the 1976 Teton Dam failure in Idaho have been fairly recent reminders of the risk that such structures pose to property and lives.

Failures have occurred for many reasons, such as sliding of concrete structures and embankments, poor concrete construction, poor bonding between old and new material, failure of gate controls, inadequate grouting, and earthquakes.

A concern over project failures, heightened by the Teton Dam failure, prompted several Government-sponsored dam safety reviews in the late 1970's. Following these reviews, the President directed that Federal water resource development agencies take certain actions to coordinate Federal dam safety programs and develop proposed safety guidelines. In proposing such guidelines, the President's Independent Review Panel of dam safety experts stated that:

> "A key to dam safety * * * is the development of an attitude by all participants in the dam building process which recognizes the existence of risk and attempts to deal with it consciously and openly."

This attitude is reflected in Corps regulations that require full-time inspection coverage of all contractor operations by inhouse personnel to ensure the safety and integrity of water projects. Similarly, the Bureau considers owner inspection and testing appropriate for structures when safety of life and property are major considerations.

Agencies take extensive quality control measures that require thorough inspection

Both the Corps and Bureau take extensive quality control measures in preparing construction designs, specifications, and contracts. Both agencies design and specify not only the finished product but also the procedures and processes to be used. For example, in both earthfill and concrete work, they

detail the selection of materials, their proper mix, placement, compaction method, and equipment use. Both agencies also give their contracting officers considerable latitude to modify specifications. This latitude allows them to cope with unforeseen conditions such as fracturing and soft areas in the foundations; bulging, slumping, and cracks in slopes; and excavation movements.

The inspector's job is to ensure that contractors observe each detailed specification as appropriate and report to the contracting officer for action any deficiencies noted and unforeseen conditions encountered. Otherwise, because of the character of water project construction, poor quality work can be easily covered over and hidden for years, threatening project safety and resulting in high operation and maintenance costs. Also, materials like concrete, once in place, often cannot feasibly be fixed and are extremely costly to replace.

Because of the variety of conditions encountered and attention to detail required, agency officials stress that persons who inspect water projects must have considerable experience and training. Agency training is available on several subjects related to inspection such as materials, sampling, handling, mixing, placing, compacting, finishing, curing, soils identification, and quality management for both concrete and earthfill construction. Many agency inspectors, but few contractor inspectors, have attended various training courses, worked on several different projects, or had many years experience as inspectors for water project construction, according to agency officials.

Agency officials prefer independent inspections for quality control purposes

Nearly all agency officials interviewed preferred that construction inspections be done by parties independent of the construction contractors for quality control purposes. They perceived construction contractors to be more production oriented and less concerned about construction quality than agency personnel. They felt that production pressures could cause contractor inspectors to lose objectivity when faced with unforeseen conditions or details of work that might be costly or time consuming for the contractor to handle.

The contractor project managers at three of four Corps projects visited acknowledged that contractor inspectors have trouble being totally objective about construction quality. As one of them explained: "It's hard to keep unbiased when you're going against your own company. There's a tendency to try to dispute any Corps tests that fail." A Bureau contractor expressed a similar view:

"Our inspectors would have problems being objective; who they answer to would be the key. They would naturally be inclined towards the best interest of the contractor since that is who pays them."

At each of the four Corps projects visited, some foremen had a dual responsibility--construction and inspection. Since contractors evaluate foremen on their productivity, foremen are in a particularly difficult position to be objective about inspection matters. For example, at one project, one such foreman, after being told his measured 12-inch layer of fill material exceeded the maximum allowed for good compaction, responded that the Corps inspector was "full of [expletive deleted] and just imagining it" and "I don't care anyway."

Construction officials object to contractor inspections due to product quality concerns

Agency and contractor officials interviewed at both field and headquarters levels criticized the contractor inspection concept in terms of their own concerns about project safety, construction quality control, and inspector objectivity and qualifications. Following are some of the comments we received from construction officials.

Corps personnel

--"CQC [contractor inspection] is a joke. The Government derives no benefit from it. We've placed the contractor in a conflict of interest position and then act surprised when he follows his own interests instead of the Corps'. It falls on the Corps to keep him honest." (attorney)

--"You have a conflict of interest when a foreman is a CQC man. They are production oriented--they have to be. They are paid for production, and you can't serve two masters. We still make all of the decisions." (chief of construction)

--"Certain types of construction are more appropriate for certain quality control methods. CQC is best where there's no danger to life and property, like roads and buildings. Agency quality control is best where the potential loss is great and the need for good quality control is high. * * * Too many [contractor inspectors] here are in the direct line of production. They're under pressure to get the job done no matter what it takes. It's hard for them to be objective." (inspector)

--"I've spent 25 years in the Corps, with most of it in testing--I remember what it was like before we started CQC and what happened after. CQC has never worked, and I've been very vocal about it. There's two basic reasons why it doesn't work: (1) It's very difficult for a contractor to get qualified CQC personnel and (2) it's very difficult to get someone to make a bad report on the person that pays their salary. My experience is that the CQC man will do only what you force him to do, and he's very careful about rocking the boat." (laboratory chief)

--"I wouldn't say anything negative about [the contractor inspectors'] ability to recognize errors. The question is how they will handle an error. I've seen cases where they've obviously said 'I'm not going to say anything about that--it will cost a bunch and I don't think they'll find it.' They tend to justify to themselves that it's not really important, because they're production oriented." (concrete engineer)

Bureau personnel

--"We've tried contractor inspection on small contracts, but we've found that if you're not watching, the contractor inspection dwindles. In some cases, like fencing, it can be beneficial--but you still need to check it. Any part of construction, no matter how minor, can lead to serious repercussions later." (general engineer)

--"Agency inspection is the most trustworthy--our people have nothing to gain or lose. * * * There are always pressures, no matter how subtle, that would affect CQC people. In testing, a CQC person is very likely to come up with the results the contractor wants to come up with." (laboratory chief)

Contractor personnel

--"The contractor is out to make money, and he'll perform the work in the least expensive method--which may be not quite in accordance with the specs. CQC people will rationalize that even if the specs aren't met, the end product will be adequate, and their tests will reflect this." (former chief of contractor inspection)

--"There's a tendency [for the contractor inspectors] to be oriented toward the company, and they have to be monitored to help them be objective. It hasn't

ever been a problem, because there have always been Corps people around." (Corps contractor's project manager)

--"There's no doubt that contractor inspection creates a conflict of interest. I would prefer inspection to be handled by anyone but the contractor. It's just not in the Government's best interests to have CQC." (Bureau contractor's project manager)

The Associated General Contractors of America has stated in annual meetings with the Corps from 1974 to 1980 that its member companies find contractor inspection to be duplicative, unrealistic, and confusing.

Several Corps personnel cited an unfortunate Corps experience that demonstrates their concerns regarding contractor inspection. The Corps was using the contractor inspection approach and relying on contractor inspections during the construction of West Point Dam, which is located on the Chattahoochee River between Georgia and Alabama. In 1973, late in construction, the Corps decided to check the contractor's work to assure that the contractor's inspections were adequate. A Corps test revealed that the contractor had failed to meet critical contract specifications on the density of the embankment. As a result, the Corps directed the contractor to remove and replace approximately 260,000 cubic yards of fill material at an additional cost to the Government of about $1.7 million. The district engineer for that project stated that the dam probably would have failed had the material not been replaced. Pictures indicating the extent and location of defective material removed are on page 16.

OTHER WATER RESOURCE DEVELOPMENT AGENCIES USE AGENCY INSPECTIONS

Other water resource development agencies inspect construction independently, without requiring contractor inspections, due to concerns about project quality. These agencies include the Bureau, the Tennessee Valley Authority, the Soil Conservation Service, and California's Department of Water Resources. Because the Tennessee Valley Authority uses its own construction forces to build its projects and the Soil Conservation Service usually constructs small watershed projects, we did not evaluate their their experience with agency inspections.

Generally, Bureau headquarters and project level officials interviewed opposed the concept of having the contractor inspect water project construction activities. They believed that it would not reduce agency staff needs but would instead cause a duplication of effort and increased costs. Their reasons for preferring agency inspection are similar to Corps officials' objections to contractor inspections--concern about project safety, inspector qualifications, and contractor objectivity.

REMOVAL OF INADEQUATELY COMPACTED FILL
WEST POINT DAM, GA.

COMPLETED DAM

SOURCES - CORPS PHOTOGRAPH

The State of California's Department of Water Resources also prefers to do its own inspection and patterned its inspection approach after the Bureau's. It uses this approach for basically the same reasons that the Corps objects to contractor inspection. According to the department's chief of design and construction, "When the (contractor's) project manager has to make a choice between his production staff and some CQC man, he'll go for production." Other department officials also opposed the contractor inspection approach and favored agency inspection as the best way to guarantee project quality. The department planned to continue using its own people to inspect construction on State water resource projects.

CONTRACTOR INSPECTION DOES NOT ACHIEVE EXPECTED BENEFITS

The Corps expected contractor inspection to provide the following benefits but, generally, none of these have been achieved:

--Improved construction quality.

--Reduced Corps staffing.

--Improved contractor job control.

--Holding contractors liable for their own mistakes.

The expectation that these benefits would result was shown by the Chief of Engineers' directive implementing DOD's contractor inspection policy, the civil works directorate's implementing regulations, and a clarifying letter to us from the Corps' Executive Director of Civil Works, dated September 11, 1980.

Several studies and evaluations of the Corps' contractor inspection program have indicated that these benefits have not been achieved:

--In 1970 the Corps Inspector General sent a questionnaire on contractor inspection to Corps field divisions. Most responses indicated that the program had not helped to improve construction quality or reduce Government inspection.

--In 1972 we examined the effectiveness of contractor inspection at five construction projects in the Corps' North Pacific Division. Our report found that Corps officials believed that contractor inspectors were not sufficiently independent and objective to ensure full protection of the Government's interest. The report also found that the Corps and contractors were

duplicating inspection staff and facilities and concluded that the program was not achieving its objectives of reduced cost and improved quality.

--In 1977 the Corps studied its inspection program in response to a Presidential directive to review all Corps activities that could affect dam safety. The report's study team found that contractor inspection had not provided adequate assurance of construction quality and recommended that the Corps be solely responsible for conducting the inspections.

--In 1980 the Corps hired a consultant for a project designed to help it evaluate the contractor inspection program by comparing six Corps projects with six other public and private construction projects. The project team reported a serious potential for conflict of interest when profit-oriented contractors inspect their own workmanship. The evaluation also reported a costly and unwarranted duplication of effort in Corps inspection programs and recommended that the Corps abandon the formal structured staffing and organization requirements which it imposes on construction contractors.

In response to those evaluations, the Corps developed certain changes in its regulations, such as allowing contractors greater latitude in establishing a quality control organization. More recently, the civil works construction branch developed other proposed changes to the regulations, such as eliminating the requirement for daily inspection reports. Moreover, according to the Executive Director of Civil Works, the Corps recently began a review of its quality management system, including policy guidance, throughout its entire area of military and civil works responsibilities. As of June 1981, those efforts were still in process.

The following sections summarize the evidence found in this review regarding each of the expected benefits of contractor inspection.

Numerous sources indicate that construction quality has not improved

Although we did not try to judge construction quality in total, several sources indicated that contractor inspection has not improved construction quality over agency inspection. For example:

--The Corps-initiated studies mentioned above concluded that the program had no effect on quality.

--All of the Corps inspectors interviewed who responded to our question about the effects of contractor inspections on construction quality claimed that contractor inspection had not improved construction quality.

--Contractors interviewed who had worked on both Corps and Bureau contracts claimed that the different inspection approaches had no effect on the quality of their work.

Corps staffing requirements have not been reduced

Most Corps inspectors interviewed claimed that, because they were doing all the necessary inspections themselves, additional Corps staff would not be needed if contractor inspections were abandoned. Indeed, at each project visited, the Corps had staffed their inspector positions before receiving the contractor's inspection plan and, as shown below, had staffed each project at a considerably higher level than the contractors.

Project	Corps inspection personnel	Contractor inspection personnel
Bonneville Second Powerhouse	40	9
Richard B. Russell Dam	32	13
Red River Waterway	30	5
Warm Springs Dam	50	6
Total	152	33

The contractor personnel numbers above do not include construction foremen who are also supposed to inspect the work of their own crew on a part-time basis. Construction officials told us that contractor inspection has not affected the duties of such foremen--they do not do any more inspection on Corps projects now than they did before the Corps required contractor inspection. Four individuals who had been Corps inspectors since before 1966, when contractor inspection was introduced, told us that they do the same amount and type of inspection now as they did before 1966.

Contractor job control is unaffected

The Corps expected that contractors using contractor inspection could better control their own work and avoid delays

by scheduling tests and inspections at times that do not interrupt production. However, both Corps and contractor officials interviewed at the four projects visited generally agreed that delays caused by agency inspections were few and insignificant and that proper scheduling was not affected by who did the inspection. Bureau officials and contractors interviewed at the two Bureau projects visited also supported these views.

Contractors' liability is unaffected

The Corps expected contractor inspection to improve the Government's ability to hold contractors liable for the cost of correcting their own mistakes. However, neither Corps nor contractor officials were able to cite a case that substantiated this claim for civil works projects. None of the contractor officials interviewed claimed the inspection method would affect liability, since the contractor is required to meet all of the terms of the contract regardless of who performs the inspections.

CONTRACTOR INSPECTION INCREASES GOVERNMENT COSTS

Since contractor inspections increased contract costs without affecting agency staffing or construction quality, the program has resulted in higher costs to the Government. Construction officials at each project visited said that construction costs could be reduced if the requirement for contractor inspections were eliminated. These officials generally did not have data to determine the exact savings, but they cited potential reductions in three areas:

--Laboratory facilities. The Corps and the contractor each had a fully equipped testing laboratory at each project. A contractor official estimated that his laboratory facilities on one project cost as much as $100,000.

--Employees. Thirty-one of the 33 contractor inspector positions at the four projects reviewed could be eliminated without reducing inspection coverage, in the opinion of construction officials. Salary costs for such positions at one project, Bonneville Second Powerhouse, were running about $180,000 annually.

--Administration. Potential reductions were cited for the contractors' costs of clerical help and inspector vehicles and the Corps cost of supervising and monitoring contractor inspections. Dollar estimates were unavailable.

The total value of these reductions is approximately 1 percent of construction contract costs. Several sources support this figure:

--Our 1972 report showed that five contractors with contracts totaling $160.4 million had increased their bids by a total of $1.6 million to cover the costs of contractor inspection.

--The 1980 Corps/consultant project team showed contractor inspection costs ranging from 0.75 to 2 percent on six Corps projects.

--Three contractors who volunteered estimates during the course of this review reported increases in their bids of 0.85, 1.0, and 1.0 percent, respectively, to cover contractor inspection costs.

To estimate the total additional cost to the Government of contractor inspections, we used construction appropriation data for Corps civil works projects as a base, separated the work on water retention structures from other work (such as relocations, nonconstruction, noncontract items, etc.) for each project and applied the 1-percent rate as shown below:

Fiscal year	Total construction cost	Water reservoir cost	Contractor inspection cost
	(millions)		
1980	$1,524.6	$590.6	$5.9
1981	1,658.1	585.3	5.9
1982	1,801.7	667.2	6.7

These figures indicate that costs to the Government could be reduced about $6-$7 million annually if contractor inspections were no longer required for water project construction.

AGENCY INSPECTION AVOIDS THE PROBLEMS OF CONTRACTOR INSPECTION

The Bureau and Corps have comparable construction inspection standards and goals, but the Bureau achieves those goals without significantly duplicating inspections.

Both the Corps and Bureau inspect the same kind of construction activities with similar processes. The Bureau, which has used agency inspection throughout its history, holds contractors responsible for construction quality by including a clause in each contract's general provisions that states that the contractor is responsible for "providing quality control measures to assure that the work strictly complies with the contract requirements." The contracts do not prohibit contractors

from hiring their own inspectors although contractors had not hired any inspectors on either of the two Bureau projects we visited. Generally, contractors hold their foremen responsible for any inspection necessary to meet the contractor inspection responsibilities.

Bureau contractors coordinate with the agency's inspection staff to provide sufficient flexibility for controlling the construction work schedule.

Bureau contracts include a general provision that states:

> "Inspection or test shall not relieve the contractor of responsibility for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights of the Government after acceptance of the completed work * * *."

This disclaimer is intended to hold contractors liable for the cost of correcting their own mistakes.

The Bureau's agency inspection approach was evaluated as part of the Government-wide, Presidentially directed Dam Safety Review of 1977. The Bureau's 1976 Teton Dam failure, a disaster officially attributed to project design errors and geological factors, partially triggered this review. The Bureau's Dam Safety Report claimed that its inspection methods were considered an industry standard. This claim was not challenged by either the Ad Hoc Interagency Committee on Dam Safety or the Office of Science and Technology Policy's Independent Review Panel of Dam Safety experts, which reviewed the agency's evaluations. In fact, neither group criticized the Bureau's implementation of the agency inspection approach.

THIRD-PARTY INSPECTION IS A COSTLY ALTERNATIVE

An agency can hire an independent firm to inspect construction, and in so doing, save agency positions and avoid the objectivity problems of contractor inspection. Although some circumstances favor this approach, it is generally more costly than agency inspection.

Private companies provide third-party inspection services. Agencies use them to inspect a construction contractor's work because third parties can be employed as needed rather than continuously; third parties sometimes have high-technology equipment and expertise that the agency needs too infrequently to maintain itself; and agencies sometimes experience difficulties in adequately staffing projects with qualified agency inspectors.

The Corps was using third-party inspection at the Warm Springs and Richard B. Russell Dams and at the Red River Waterway projects. Corps officials said that they used third-party inspections because they were having trouble filling vacancies in their inspection staff. Third-party work at these locations was generally limited to gathering samples and taking tests, and the Corps was responsible for all analysis.

No large third-party inspector contracts were being used at the two Bureau projects we visited. However, the Bureau told us that it is experiencing increasing pressure to use third-party inspections because of difficulty in adequately staffing project construction offices with qualified inspectors. (See p. 29.)

Corps and Bureau experiences with third-party inspection show that it is generally costly. For example, the billing rate in a third-party contract at Richard B. Russell Dam was $25.17 per hour for engineering technicians. In that same area, the Corps billing rate, including all overhead and fringe benefits, was $15.59 per hour for an engineering technician, or 38 percent less. A similar difference (37 percent less) was noted between third-party and Corps billing rates in the Portland, Oregon, area near the Bonneville Second Powerhouse Project. A Bureau analysis of a $332,400 third-party contract at the Tiber Dam Spillway Rehabilitation project in Montana concluded that the Bureau could have done the work itself for 16 percent less cost.

In addition to having higher contract costs, third-party inspections can be burdensome to administer. Such administration involves not only preparing and awarding the contract but also monitoring the work. Apparently, monitoring can be quite extensive for some third-party contracts. Agency officials cited examples of tendencies by third-party inspectors to take fewer tests than needed, inadequate tests, and tests based on convenience rather than need. Also, third-party inspectors' miscalculations have led to costly construction errors. To monitor third-party work, the agencies often regularly repeat a portion of it. For example, Corps inspectors at Warm Springs Dam repeated 7 to 10 percent of the third-party inspection tests. Both agency staff and agency inspection facilities are needed to perform monitoring activities.

Commenting on matters discussed in this report, the Bureau expressed concern that increasing the use of third-party inspections to alleviate agency staff shortages may cause deterioration in the quality of inspection performance. The Bureau said that high quality construction can best be assured by having agency-trained and -experienced employees perform the inspection function.

CONCLUSIONS

Thorough and objective inspection is crucial for assuring sound construction of dams and other water projects. Alternative approaches to staffing the inspection function--through agency or nonagency sources--can significantly affect construction quality and cost as well as agency personnel requirements. In determining the most appropriate approach, one factor stands out--product quality is essential to avoid the catastrophic consequences of project failure.

In our opinion, contractor self-inspection lacks the quality control essential for activities involved in constructing dams, powerhouses, and other water projects. The concerns of Corps, Bureau, and other officials about the disastrous losses of life and property involved in water project failure are valid. The extensive quality controls the agencies build into their designs, specifications, and contracts for construction seem appropriate responses to this concern and demand thorough inspections to be effective. Understandably, contractors with construction responsibilities cannot be expected to give these quality control matters as much attention as agencies entrusted with project planning, design, and operation, as well as construction responsibilities. Requiring contractors to inspect their own work creates a potentially serious conflict of interest considering the contractor's primary interest in production versus the agencies' concern for quality control.

Past experience and several studies have demonstrated the ineffectiveness of contractor inspection requirements. Rather than improving construction quality while reducing Government inspections, the requirement has resulted in a duplication of inspection efforts and facilities, unnecessary paperwork, and increased administrative costs.

DOD could avoid these unnecessary costs and burdens by exempting water project contruction activities from its contractor inspection requirement. The requirement has significantly increased the Government's construction costs over its 15-year history. Lifting the requirement should reduce costs about $6-$7 million a year.

The Corps is already performing sufficient inspections of construction activities independent of the construction contractor. Therefore, discontinuing contractor inspections would not materially increase agency staff needs. Indeed, it could help reduce those needs by relieving agency administrative burdens.

When agency inspection staff is insufficient, contracting with third-party inspection organizations may be necessary. However, for general use, this approach appears very expensive

and administratively time consuming to monitor. For most construction activities of the Corps and Bureau, we doubt that third-party inspection is a viable alternative.

RECOMMENDATION

To help reduce costs and provide the quality control essential for activities involved in constructing dams, powerhouses, and other water projects, we recommend that the Secretary of Defense exempt Corps water project construction activities from the requirement for contractor inspections.

AGENCY COMMENTS AND OUR EVALUATION

A draft of this report was sent to the Departments of the Army, Defense, and the Interior. Responses were received from Army and Interior. DOD's GAO liaison official told us that Army's response was coordinated with DOD and represents the views of both Departments.

Both Army and Interior concurred with our recommendation. Army observed, however, and we concur, that eliminating the requirement for contractor inspections does not absolve contractors from the responsibility and liability for mistakes which they may make in meeting the quality standards that are set in the plans and specifications, and contractors will still be responsible for their day-to-day operations. As discussed on pages 17 to 22, establishing contractor inspections had little if any effect on these matters for water project construction, and the Bureau has held its contractors responsible for such matters, without requiring contractor inspections.

These and other Army and Interior comments and our response are in appendixes II and III.

PRIMARY ORGANIZATIONS

INVOLVED IN OUR REVIEW

Federal construction agencies:

- Corps of Engineers, Department of the Army:
  - Chief of Engineers, Washington, D.C.
  - Portland District, Portland, Oregon
  - San Francisco District, San Francisco, California (Warm Springs Dam)
  - Savannah District, Savannah, Georgia (Richard B. Russell Dam)
  - New Orleans District, New Orleans, Louisiana
  - Bonneville Area Office, North Bonneville, Washington (Bonneville Second Powerhouse)
  - Shreveport Area Office, Shreveport, Louisiana (Red River Waterway)
- Bureau of Reclamation, Department of the Interior:
  - Bureau Headquarters, Washington, D.C.
  - Arizona Projects Office, Phoenix, Arizona
  - Cortez Projects Office, Cortez, Colorado (Dolores Project)

State agencies:

- California Department of Water Resources, Sacramento, California

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, D.C. 20310

26 AUG 1981

Mr. Henry Eschwege
Director, Community and
Economic Development Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

This is in reply to your letter to the Secretary of the Army regarding your draft report entitled "Costs Could Be Reduced Millions of Dollars Annually By Eliminating Contractor Inspections for Water Project Construction," (GAO Code 080540) (OSD Case #5750).

We concur with your recommendation that the Secretary of Defense exempt the Corps of Engineers civil works construction activities from the requirement for contractor inspections. However, the elimination of this requirement does not absolve the contractor from the responsibility and liability for mistakes which he may make in meeting the quality standards which are set in the plans and specifications. The contractor will still be responsible for his day-to-day operation and the control thereof.

[GAO COMMENT: See p. 25 for a discussion of these observations.]

Additional comments are provided in the enclosure.

Sincerely,

Robert K. Dawson, Deputy

for William R. Gianelli
Assistant Secretary of the Army
(Civil Works)

1 Enclosure
As stated

APPENDIX II

Comments on Draft GAO Report
"Costs Could Be Reduced Millions
Annually by Eliminating Contractor
Inspection for Water Projects"

The following general comments are provided on the report:

a. Although the contractor is responsible for meeting the plans and specifications, the Government is charged with the acceptance testing of materials as they are placed in the final structure.

[GAO COMMENT: We agree.]

b. There are some instances, such as relocations, where the concept of Contractor Quality Control (CQC) can be applied successfully. These applications should be limited to Contracts which are not critical to the overall project safety.

[GAO COMMENT: As discussed on p. 4, we eliminated relocations and other such applications from our study because of their less critical nature for inspection purposes.]

c. Some testing, such as pile tests or pressure testing of penstocks, must be accomplished by the contractor, because of the equipment requirements for these tests. Government personnel must witness the results.

[GAO COMMENT: We agree that contractors should be used in helping the Corps accomplish such tests.]

d. Although the sample projects which GAO visited were adequately staffed for the Government to assume quality control, this is probably not the case in all civil works construction projects. On some less adequately staffed projects, there would be a need for further staffing and/or S&I money to take up the duties covered if Contractor Quality Control is eliminated.

[GAO COMMENT: Although we visited only four Corps projects, our interviews covered 95 individuals at various levels of the agencies and contractor organizations. Our discussions with these persons were generally not limited to the sample projects visited. Generally, these interviews indicated to us that Corps water projects construction work is adequately staffed with agency inspectors. Also, as pointed out on pp. 7 and 8, the Corps' regulations encourage full agency reliance on its own inspections for water project construction. Therefore, we doubt that any significant further agency staffing would be needed if contractor inspections were eliminated.]

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

AUG 31 1987

Mr. Henry Eschwege
Director
Community and Economic Development
Division
U.S. General Accounting Office
Washington, DC 20548

Dear Mr. Eschwege:

We have reviewed the GAO draft report, entitled, Costs Could Be Reduced Millions of Dollars Annually by Eliminating Contractor Inspections for Water Project Construction, and agree with its conclusions and recommendation.

We do, however, offer a few comments relating to third-party inspections. The Bureau of Reclamation is experiencing increasing pressure to utilize this method because of difficulty in adequately staffing project construction offices with qualified inspectors. This is partially due to the reluctance of Bureau staff to transfer from one location to another. Increased costs of housing, high mortgage interest rates, inability to sell homes, high moving costs, etc, are major deterrents to relocating. Also, we perceive a trend among field construction personnel to place a higher value on a more stable existence, i.e. less relocating, than they have in the past.

In our view, if this trend is not overcome, inspection and possibly construction management functions will, in some instances, have to be performed by a third party. If this happens, we would have a concern about the potential for deterioration in the quality of performance in these areas. We believe the high quality of construction that is essential can best be assured by having long-term agency employees (with in-house training and broad experience in water project construction) performing the inspection and construction management functions.

We therefore, suggest that the section of the report entitled, "Third Party Inspection Is A Costly Alternative," be expanded to include an expression of the aforementioned concern.

[GAO COMMENT: We expanded that section to reflect this concern. See p. 23.]

APPENDIX III

We appreciate the opportunity to comment on the draft report prior to its issuance to Congress.

Sincerely,

Assistant Secretary for
Land and Water Resources

(080540)